DOCUMENT RESUME

ED 380 655 CE 068 608

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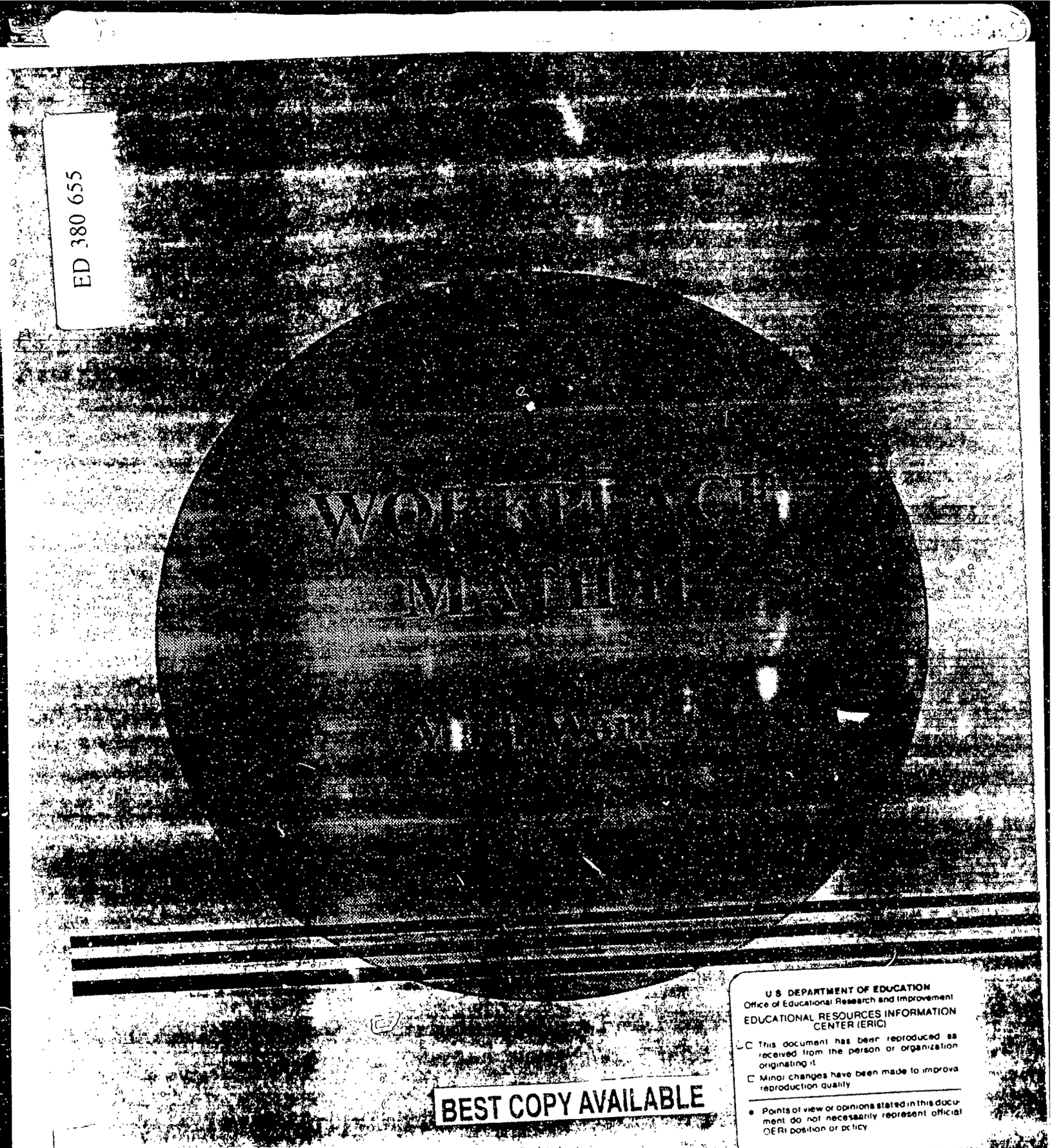
TITLE Workplace Math II: Math Works!
INSTITUTION Colorado State Community Coll. and Occupational Education System, Denver.; Pikes Peak Community Coll., Colorado Springs.
SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, DC. National Workplace Literacy Program.
PUB DATE 94
NOTE 63p.; For related documents, see CE 068 598-610.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Adult Basic Education; Behavioral Objectives; Community Colleges; High School Equivalency Programs; Job Skills; Learning Activities; Learning Modules; *Literacy Education; Manufacturing; *Mathematical Applications; *Mathematics Instruction; *Mathematics Skills; Printing; Problem Solving; Thinking Skills; Two Year Colleges
IDENTIFIERS *Workplace Literacy

ABSTRACT

This learning module, a continuation of the math I module, provides review and practice of the concepts explored in the earlier module at an intermediate level involving workplace problems. The following concepts are covered: instruction in performing basic computations, using general numerical concepts such as whole numbers, fractions, decimals, averages, ratios, proportions, percentages, and equivalents in practical situations. The problems are relevant to all aspects of the printing and manufacturing industry, with emphasis on measurement skills, converting fractions to decimals, reading a ruler, and figuring cost information that might be used in a customer service environment. The module includes units for six class sessions. Each unit includes the following materials: rationale, learning objectives, curriculum notes and references for the instructor, course outline, introduction, evaluations, information sheets, problems to solve, and transparency masters. Supplementary materials include a mathematics outline, a syllabus, pretest and posttest with answer keys, and handouts. (KC)



Colorado Community College and Occupational Education System
United States Department of Education
Corporate, Workforce, & Economic Development, a division of
Pikes Peak Community College
Current, Inc.

WORKPLACE MATH II:
Math Works!

This is a continuation review and practice of the concepts explored in Workplace Math I at an intermediate level. Students will look at problems of their individual work areas that involve intermediate math computation.

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INTRODUCTION

The Workplace Classroom is a set of 11 curriculum modules created by workplace educators from Pikes Peak Community College in collaboration and partnership with employees of Current, Inc., a large greeting card company in Colorado Springs, Colorado. The partnership was formed through an 18-month federal workplace research and development grant from the United States Department of Education awarded to the Colorado Community College and Occupational Education System. Teachers in the project designed, developed and field-tested curricula and materials for the 11 basic skills courses through the process of identifying and understanding the culture of the workplace and the learning needs of the individuals working within it.

The Pikes Peak staff chose not to rely on ready-made materials or programmed texts with which to teach classes. Instead, teachers and curriculum specialists interviewed employees, created job profiles, developed customized assessments, and invited student participation in the development of class content. The result is a unique set of curriculum modules in learning to learn, reading, writing, communication, problem solving, English as a second language, math and algebra that reflect learning needs of real people in a large printing/manufacturing environment. These modules were designed as six week, two hour classes, but the learning rationale and intentions could easily be modified to accommodate longer or shorter sessions.

The idea of following a design process involving the active and continuous commitment and participation of the employee and the employer provides a fresh look at the development of curricula and instruction. The goal of this process is to develop a curriculum product that enhances the basic literacy skills of adults and increases critical thinking and problem solving skills that are easily transferred to occupational improvement. The Pikes Peak staff felt that the best way to reach this goal was to involve employees and employers in the many levels of curriculum development and design.

We believe that these curriculum products are genuine reflections of sound adult learning theory that says adults must have relevant learning experiences that build on prior knowledge and in some way advance positive change in their daily work lives. These modules were built through the active participation and assessment of the adult students for whom they were designed. Those of us who developed these products encourage other workplace educators to use them in part or as complete modules, keeping in mind that their very design welcomes the change and diversity that other workplace environments are sure to lend to them. We feel that the authenticity of our curricula will provide ideas and incentive to other teachers and curriculum specialists who are beginning new programs or are looking for ways of improving existing curricula.

Best of luck with any or all of the Workplace Literacy Modules.

Rita Moore

Rita Moore, Project Leader
Workplace Literacy Grant Pikes Peak Community College

"This course helped me on goal setting, figuring hourly counts while on the planning team, and on filling out the production sheets".

Math II Student

WORKPLACE MATH II: Math Works!

Rationale:

This approach to Math II is designed to have students interact with mathematics in some new ways. Most adult learners have a traditional math education background, characterized by paper and pencil drill and practice, rote learning and memorization, and a dry and intellectual climate. Students worked independently and quietly and discussion and verbalization of ideas was not encouraged.

While this works for many students, it fails others. Some people may not fully understand the basic ideas of place value and estimation or lack skill in number operations. More often, people approach math with a sense of discomfort or low self confidence, coupled with a high anxiety level.

Teaching adults in a basic skill math class is difficult because everyone comes to the class with a different skill and confidence level. It helps to do something that none of the students have done before, because everyone starts at the same place, nobody can coast through the sections at which they are highly skilled, and everyone must think of the ideas behind the methods rather than rely on memory and prior learning. A fresh approach is refreshing, also.

One of the most effective and enjoyable things to do is to allow the learners to communicate, both orally and in writing about the ideas they are relearning. It helps to share about previous math experiences so that the instructor knows the anxiety and confidence level of the learners. Verbalizing about our experience and conceptualizations in math is new in itself and is necessary for full understanding.

Another interesting thing to do is to use manipulatives whenever possible. This curriculum is written with this focus. It allows the student the new approach which nobody has done before, yet it is simple and effective. Many of the students will understand fractions for the first time using the pattern blocks and Cuissenaire rods. It also decreases the anxiety level of the students, because the manipulatives encourage play and experimentation. It doesn't really fell like "math" anymore.

Finally, showing students how to do number operations in a new way can really bolster their self-confidence and is an effective way to teach place value. Adding and subtracting from left to right forces students to use place value and it builds on the adult skills they have practiced when working with money. It is sound mathematically and some students understand "carrying" and "borrowing" for the first time. They are very verbal with this new understanding and it is fun and important to encourage this communication. It solidifies the ideas.

Rita Moore
Project Leader

Nancy Wilson and Claire Goschen
Authors

WORKPLACE MATH II: Math Works!
SESSION I

"I think that some people are just too shy to admit they don't understand. This class helped me understand without feeling embarassed."

Math II Student

Learning Intentions:

- Review Math I mental addition, multiplication, and division. Review Math I work with pattern blocks and fractions. Establish course goals. (See preface)

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Administrative Details

A. Attendance and class roster
B. Participant Data Sheets
C. 4 x 6 cards
   - name
   - work extension
   - department name and number
   - work days and hours
   - home phone (optional)
   - personal information
D. Participant learner packet
E. Portfolio
F. My goals: Self-improvement, problem solving, confidence, skill improvement for the class
   - Handout - Goal checklist
   - Discuss Workplace Math needs

II. Place Value Review

16	32	42	65	19	38
+23	+17	+28	+25	+21	+12

III. Special Sums

1+2+3+4= 10 2+4+6+8= 20 6+7+8+9= 30

10+20+30+40= 100 20+40+60+80= 200 60+70+80+90=300

IV. Estimation Place Value

A. Add left to right:

14	16	22	19	26	11
13	18	24	28	18	12
12	17	26	37	32	34
+11	+19	+28	+46	+44	+23

341	126	121	211	246
231	137	142	411	437
112	118	163	611	628
+423	+149	+184	+811	+819

B. Multiply left to right

16	19	23	14	12	17
x 3	x 5	x 5	x 7	x 6	x 3
14	11	17	14	17	15
x12	x12	x16	x11	x13	x15
16	19	18	19	22	23
x14	x11	x13	x15	x32	x21

V. Division

A) 124 ÷ 4 or 124/4 or (100 + 24)/4 = 100/4 + 24/4 = 25 + 6 = 31

V. Division

B) 132/2 = 100/2 + 32/2 = 50 + 16 = 66 A) Does it come out even? How do you know?

C) 150/3 A) Does it come out even? Answer = 32. Try it.

D) 146/4 = 100/4 + 44/4 + 2/4

E) 129/7 Easy multiple of 7

F) 140/10 = G) 140/7 = H) 155/5 = I) 96/8 =

VI. Fractions Review

A) Definitions

B) "Trade": Trade 1 blue for other color. (2 greens) Equality
Trade yellow for another color. 6/6 3/3 2/2
Trade 1 red for another color:

C) Addition: 1/6 + 2/6 = 3/6 (trade for 1/2)
1/3 + 1/6 = (trade blue for greens, then count)
1/6 + 1/2 =
2/3 + 1/6 =
1/2 + 2/3 =
1/2 + 1/6 + 1/3 =
2/3 + 5/6 =
1 1/3 + 2 1/2 =

D) Make up a problem for yourself. Get the answer. Give the problem to someone else to solve. Check.

VII. Show this process step by step. (sentences) Use blocks.

A) 10/6 = 6/6 + 4/6 = 6/6 + 4/6 = 1 + 4/6 = 1 + 4/6 = 1 2/3

B) 5/2 = 4/2 + 1/2 = 4/2 + 1/2 = 2 + 1/2

C) 8/3 = 6/3 + 2/3 = 6/3 + 2/3 = 2 + 2/3

Journaling. Explain each step in English. Explain reasons.

1) 14/6 = 12/6 + 2/6 2) 12/6 + 2/6 = 2 2/6 3) 2 2/6 = 2 2/3

VIII. Mixed Number Assignment

A) 1 2/3 + 3 1/6 = B) 1 2/3 + 3 1/3 = C) 1 2/3 + 3 5/6 =

D) 1 2/3 + 3 1/2 =

IX. Evaluation

A. Daily Evaluation
Students record comments about the class and how they can use their new skills on the job.

CURRICULUM NOTES:

I. **Administrative Details**

Pre-Evaluation: Every program will have some kind of record-keeping process. The procedures we've listed have worked for us. Daily attendance sheets and class rosters are kept. Students who complete four out of the six classes receive a certificate of completion at the end of the course. Participant data sheets are federal forms that information that provides a profile of the company. Four by six cards are used by instructors to collect information that will enable them to get in touch with a student outside of class or work if necessary. The participant learner packet contains a summary brochure about the program; who they may call if they have a question about scheduling, class content, etc., an explanation of the process for claiming classtime as work hours; a copy of an individual education plan, and a sample of the certificate they may receive upon class completion.

The portfolio is a folder with paper for journaling; daily evaluation sheets; and a place for students to collect their work for their own assessment and for the instructor's assessment of their work progress.

The pre-evaluation is really a form of self-assessment. Students are asked to list goals related to the course and assign numerical weight to them. At the end of the class the cards are re-examined for progress and students again assign numerical weights to their progress. (Please see attached assessment activity explanation). Students may also take a pre/post test. Administrative details at the end of the session.

Post evaluation is linked to the goal setting and assessment activity above and/or pre and post-evaluation instruments designed by teachers. The course evaluation (attached) and instructor evaluation (attached) are designed to guide the instructional team in making curriculum modifications as well as changes in teaching strategies.

III. **Special Sums**

Review the answers for special sums (1+2+3+4, 2+4+6+8, 6+7+8+9) and work some problems from left to right mentally to reinforce the process.

IV. **Estimation Place Value B.**

Review mental multiplication also using 1 and 2 digit numbers. Keep the numbers between 1 and 10 at first. It would be interesting to extend this to include larger 2 digit numbers. Write out the steps for these more complex ones:

22	23
x32	x21

V. **Division**

Show division the traditional way and this "new" way. The new one, a review from Math I can be used as a mental method for some easy problems, but doing this mentally is not really a goal. Provide enough practice as a refresher. Perhaps the students can create the problems themselves. It would be a good idea to stay with a 1 digit divisor, although the method would work for any number.

VI. **Fractions Review**

See relevant lessons in Math I about the use of pattern blocks and fractions. Provide a short "catch up" for the students who haven't taken Math I using blocks. Transfer the ideas to written symbolism. For extra challenge, have students model problems involving 3 or more fractions, then work similar ones in written form. These written problems don't have to be ones with large denominators unless the students have this workplace learning need. The process of converting to common denominators is important, but it need not be arithmetically complicated.

VII. **Show this Process Step by Step**

This provides practice on reducing improper fractions using blocks. Have the students verbalize the process during or after they finished either orally or in their journals. Summarize on the board what the students say. An example of the types of sentences could be:

"Organize the 10 green blocks into groups of 6 and 4, because the 6 can be cashed in for a unit. Cash in the 6 greens for 1 yellow, and then the 4 green for 2 blue ones. The reduced answer for 10/6 is 1 2/3."

VII. **Show this Process Step by Step** Continued

Transfer the ideas into math process using written symbolism. Again, explain the steps involved. They might read like this:

"Rename 10/6 to (6+4)/6 because 6 is a multiple of 6. Separate the two fractions to 6/6 + 4/6. Reduce 6/6 to equal 1. Reduce 4/6 to equal 2/3."

VIII. **Mixed Number Assessment**

Provide some more practice on mixed number addition using unlike denominators. If students seem to like the blocks, use denominators of 2,3 and 6 so they can be modeled in blocks as well as done i n written form. Place value is important, since it allows us to add ones with other ones, doing this step either first or last in the process.

Class: _____

Date: _____

Instructor: _____

	Name	Dept. Number	S. S. Number
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			
31.			

SKILLS FOR A COMPETITIVE WORKFORCE
PARTICIPANT DATA SHEET

Please fill out the following information. Print or write clearly. This information will be used for demographic and statistical purposes only.

SECTION I (Identification)

Name:_____ Social Security Number: ___ - ___ - ____
Last Name, First Name Middle Initial

Street Address:_____ City:_____ Zip Code:_____

Phone Number: (___) ___ - ____

Department: _____ Position:_____

SECTION II (demographic information)

1. Yrs. with company (circle one): a. unemployed b. 0-5 c. 6-10 d. 11-15 e. over 16

2. Age: __ 3. Sex: M F

4. Ethnicity (circle one): a. White b. Black c. Hispanic d. American Indian/Alaska Native e. Asian/Pacific Islander f. Other

5. Single: Y N
Head of Household: Y N

6. Is English your second language? Y N

7. Participating in (circle one or more):
   a. Basic Skills Program
   b. GED Program
   c. ESL Program

SECTION III (outcome information)

Assesment Planning:

8. Course Title:_____ (check one: ___ Basic Skills, ___ GED, ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
9.	Test Higher on Basic Skills: _____				Y N
10.	Improved Communication Skills:				Y N
11.	Increased Productivity:				Y N
12.	Improved Work Attendance:				Y N
13.	Increased Self-Esteem:				Y N

14. Contact Hours: ___ ___ ___ ___

15. Course Title:_____ (check one: ___ Basic Skills. ___ GED. ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
16.	Test Higner on Basic Skills: _____				Y N
17.	Improved Communication Skills:				Y N
18.	Increased Productivity:				Y N
19.	Improved Work Attendance:				Y N
20.	Increased Self-Esteem:				Y N

21. Contact Hours: ___ ___ ___ ___

22. Course Title:_____ (check one: ___ Basic Skills. ___ GED. ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
23.	Test Higner on Basic Skills: _____				Y N
24.	Improved Communication Skills:				Y N
25.	Increased Productivity:				Y N
26.	Improved Work Attendance:				Y N
27.	Increased Self-Esteem:				Y N

28. Contact Hours: ___ ___ ___ ___

29. Course Title:_____ (check one: ___ Basic Skills. ___ GED. ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
30.	Test Higner on Basic Skills: _____				Y N
31.	Improved Communication Skills:				Y N
32.	Increased Productivity:				Y N
33.	Improved Work Attendance:				Y N
34.	Increased Self-Esteem:				Y N

35. Contact Hours: ___ ___ ___ ___

EVALUATION

STUDENT DAILY LOG

NAME:

DATE:

CLASS:

1. What did you learn today? What did you find useful about the lesson? How was it interesting?

2. What did you find not necessarily useful, and what could have been done to improve the effectiveness of the lesson?

3. What other reactions do you have to the class, materials, discussion, etc.?

4. Are you comfortable with the material? Why or why not?

5. How have you used any of the information learned in previous classes?

WORKPLACE MATH II: Math Works!
SESSION II

"I like having small classes. It makes it easier for me to open up and ask questions, and you get more of a one on one relationship with the instructor."

Math II Student

Learning Intentions:

- Introduction to ratio, ratios using Cuisinairre rods, Algebra extensions with rods.
- A resource on this lesson is the book "A collection of math lessons for grades 6 though 8", by Burns and McLaughlin, Math Solution Publications, 1990, pages 81-90.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Ice Breaker - Groups of 4.

- Do 3 coop logic puzzles.
- Strategies -Discuss
- Today we're working on: A) strategy B) skills

II. Pretest

- Review

12					
16	14				
18	15				
17	11				
16	14	16	17	13	19
+13	+14	x14	x12	x17	x11

19	25	47	95	62
4 =	6 =	7 =	5 =	8 =

156	194	752	192
9 =	6 =	8 =	8 =

III. Rods & Fractions

- Prove that yellow is half as long as orange.
- Find all other pairs for which one is half as long as the other.
- Prove it. Leave set up for reference.
  - * What did you notice as you did this?
- Writing: 2 relationship sentences each.

  0 = 2y
  y = 1/2o

- Name other pairs of sentences
- Summarize

IV. Partners

- Compare blue and light green. Name 2 sentences for each relation.
- Find all other pairs where one is 1/3 of the other.
- Do same for 1/4, 1/5, 1/6, etc. up to 1/10. Get all you can. Compare-Record

V. Now Investigate

1) red and light green
2) red and blue
3) purple and orange
4) yellow and purple
5) orange and dark green
6) g = 1/2 r, r = 2/3 g
7) b = 4 1/2 r, r = 2/9 b
8) o = 2 1/2 p , p = 4/10 o
9) p = 4/5 y
10) dg = 3/50

Continue with more pairs for relations.

They explain: r = 2/3 g g = 1 1/2 r why? what is your thinking?
o = 2 1/2 p p = 2/50 How are they measured?

VI. Assessment

Assessment

- Ratio and proportion to make the estimates

A) How many light green used to measure.
B) How many other rods of other lengths to measure same?
10 L.g = 5 Dk g = 2 L. g. half = d. g. $\frac{\_}{2} = \frac{\_5}{10}$
C) Find out blue,red, white for same, use info about record for each.
D) Do purple if finished early.
E) Together wrap up with reds.

Curriculum Notes:

Cuisenaire Rods are a teaching tool used with children to teach number theory. They are organized in lengths to represent numbers 1 through 10, with each quantity a different color. It is helpful in this lesson for students to work in pairs or be verbal in their exploration as a large group.

III. Rods & Fractions

Prove, using the rods, that the yellow rod is half as long as the orange rod.

Discuss afterwards how people approached this. Some "eyeball" it. Some measure it using unit or other rods. Some might use 2 yellow ones to show the length is that of the orange. Then find all of the other pairs with the same relationship. What did the students notice?

Describe one relationship for them using symbolic writing. Each relationship gets two associated sentences. Have students write 2 sentences for each of the other 4 relationships.

0 = 2y
y = 1/2 0

IV. Partners

Do the same thing only change the relationship. Blue and light green have a relationship where one is 1/3 the other. Investigate all possibilities for 1/4, 1/5, 1/6, etc. up to 1/10. Record these in journals or on the board.

V. Now Investigate

Investigate other pairs of colors that have a less convenient relationship. Some of the relationships are summarized here:

r = 2/3 g g = 1 1/2 r

blue = 4 1/2 red, r = 2/9 blue

0 = 2 1/2 p, p = 4/10 o

y = 1 1/4 p , p = 4/5 y

o = 1 2/3 dark green, dark green = 3/5 o

0 = 1 1/9 blue, blue = 9/10 o

V. Now Investigate Continued:

0 = 10 w, w = 1/10 o

brown = 1 1/7 black, black = 7/8 blue

Expect some problems with these as the students struggle with the relationships. Not everyone will struggle. The verbalizations will help. Why is it that way? Does everyone agree? Explain your reasoning. Allow mistakes. The easiest might be o = 10w,w= 1/10 o because it has a transfer into money and involves simple counting.

VI. Assessment

Using the rods to make estimates is a way of using the rods to lead into ratios and proportions. Have students measure the width of their table or desk or some other appropriate item using light green and then dark green rods. Record the number of rods. Then have them estimate without actually measuring and record their estimates for the number of blue, red, and white rods it would take to measure the same distance using the information they know about the light and dark green rods. Verbalization is important. Having them work in pairs is helpful. It's hard to follow someone else's reasoning, but this isn't as important as verbalizing one's own.

WORKPLACE MATH II: Math Works!
SESSION III

"I work with fractions and decimals everyday, and this class helps me to add, subtract, divide and multiply."

Math II Student

Learning Intentions:

- Cooperative logic and problem solving, review of ratios and proportions using rods, application of ratios by gathering statistics, calculating tips and discounts, and using percentages.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Return Assessments

II. Cooperative Logic Puzzle. Warm up envelopes

III. Review

A: (Add)

					13
					23
					24
14	22	56	42	66	13
13	33	57	41	77	24
12	41	58	3	89	4
+11	+14	+59	+24	+99	+9

B: (Multiply)

16	13	15	19	12	19
x14	x17	x15	x11	x18	x12

C: (Divide)

22 / 8 =	19 / 4 =	32 / 7 =	155 / 6 =	342 / 4 =

IV. Rods (Review from last week) writing 2 sentences

A: orange and yellow
o = 2 y or y = 1/2o

B: red and purple
C: white and brown
D: Lt green and Dark green

More Difficult Ones

(1) Red and light green	g = 3/2 r r = 2/3 g
(2) red and blue	B = 4 1/2 r, r = 2/9 B
(3) purple and orange	o = 2 1/2 p p = 4/10 o
(4) yellow and purple	p = 4/54 y = 5/4 o
(5) orange and dark green	dg = 3/50 o = 5/3 dg

Journaling: Explain one of the more difficult ones. Explain both sentences. (Choose same one) Then compare with neighbor.

V. Ratio and Proportion

- How many Lt green to measure width of table. Record on both.
- Dk g = 2 L How many Dg. Estimate. Then verify.
- 10 L = 5 Dg
- 2 L = 1 Dg

- Estimate Blue, red, white. Use info about Dg and L o make initial estimate. Record .
- Now purple.
- Estimate, measure, compare, verify, correct if necessary.
- Journaling . Explain how this has to do with ratio.

VI. Application of Ratios - % Stats

- Number of left handers in class.
- Number of left handers in America. 12%
- If 75 people fit in a bus, could 12% of a group of 500 go?

VI. Application of Ratios - % Stats Continued

TIP:
32.50
12.90
47.50

% Of Discount	10%	25%	20%	15%
	$60			
	$54			
	$75			

Better Deal: $0.70 off or 10% of $8.00
$5.00

Curriculum Notes:

II. Cooperative logic puzzle

Groups of 3 or 4 solve a logic problem together. A good source for these is the book called "Getting it together, Math problems for grades 4 - 12". A copy can be obtained by contacting EQUALS at Lawrence Hall of Science, University of California, Berkeley, Ca., 94720. The elementary ones are challenging enough for a quick warm up or as material for discussing problem solving on teams. The challenging ones are quite difficult even for adults. Some samples are attached to this curriculum. Copy the master sheet and then make group sets by cutting the clue cards apart. It works nicely to then put the group set in an envelope. Each group gets an envelope with the set of clue cards inside and distributes them. The group task is to then solve the question presented within the cards without putting all of the cards down on the table. It encourages all members to contribute.

IV. Rods

Review rods and the writing of sentences that were done in session 2. Write 2 sentences for each relationship as in session 2, including the more difficult ones. Have them journal another of these difficult ones, explaining why their sentences are correct and the reasoning they went through to arrive at this conclusion. They may then want to share. Again it is not necessary that everyone be correct or that everyone be able to follow someone else's reasoning. The process of working through these relationships may take time for some people.

V. Ratio and Proportion

This section is optional. Perhaps there wasn't time in session 2 to complete it or people could use another activity of measuring. The journaling activity explaining what this has to do with ratio and proportion would be interesting. Examples of ratio that may be familiar: Cooking and increasing or shrinking the recipe, drawing realistic pictures that are not lifesize, children's hand sizes relative to their heights and adults' with theirs. Workplace examples would be powerful here.

Percentages are ratios compared with 100 and these are used everywhere.

VI. Application of Ratios - % Stats

Simple data collection:

Number of lefthanders in the class. Ask and count. Compare this to the class total and convert to a percent. The fraction method is appropriate here after all of the fraction work, but if the numbers are awkward, the instructor can show how to convert to decimals and then to percents. The national average is 12%. How does that compare with this class?

Question:
If 75 people fit in a bus, could 12% of a group of 500 go on the bus?

This point is a perfect opportunity for a workplace learning application..

Calculating a 15% tip:

Most adults have a way to calculate tips. Discussion on this can be interesting and humorous. If nobody contributes the method using the distributive law, it is a nice extension.

First practice calculating 10% of quantities mentally by moving the decimal. Then do 5% by first getting 10% and halving it. Then put the steps together and add the quantities. Mathematically it looks like this:

$$15\% \text{ of } 20 = 20\,(15\%) = 20\,(10\% + 5\%) = 20\,(10\%) + 20\,(5\%) = 2 + 1 = 3$$

Discounts are similar. Practice with different ones like 10%, 25% 50% etc. and offer questions about which is the better deal $.70 off or 10% off of $8.00.

WORKPLACE MATH II: Math Works!
SESSION IV

"It has allowed me to solve problems mentally versus running for the calculator."
Math II Student

Learning Intentions:

- Logic and problem solving, review of arithmetic, use rods to study equivalency and proportions, percents and their other forms, calculating percents, using cross product to calculate terms of proportions, estimation.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Cooperative Logic Puzzle Envelopes

II. Review Arithmetic

(A)

16	25	62	426
18	35	71	118
17	15	83	234
+19	+45	+94	+342

(B)

42	65	31
-18	-19	-12

(C)

14	12	16
x15	x18	x14

(D)

42	75	119
3 =	4 =	5 =

III. Rods

- Show me 1/2. Use favorite colors.
- Write on board in units (& colors).
- Equivalent names for 1/2: (Equal but look different).

IV. Proportions

- Measure length of notebook in longer color. then in shorter. Notice it takes twice smaller ones. Why?
- Proportions: A statement using equivalent fractions.

V. Percents

Percents: Equivalent fractions over 100 - an easy standard to compare.

2% = 2/100 5% = 5/100 10% = 10/100

VI. Fractions

- Decimal fraction forms of %

50% = 50/100 = 1/2 = .5 1.0 divided by 2

VII. Decimals:

A. .10 = 10/100 = 1/10 = .1 = 10%

.01 = 1/100 = 1%

B. 20% dif: 20/100 or 1/5 or .20 or .2 = 10% + 10%

20%of50 = 10% of 50+10% of 50 = .1x50 + .1x50 = 5+5=$10
$10 off price = $40

Mental Arithmetic

10% of $20		10% of 230	
10% of 60		10% of 450	
10% of 120		10% of 75	
10% of 90		10% of 32	
20% of 85	15% of 45	30% of 80	25% of 140
20% of 60	15% of 80	40% of 170	25% of 60
20% of 90	15% of 120	50% of 200	
20% of 48	15% of 30	25% of 80	

VIII. Rods

- Show me 25% 2 different ways.
- Proportions
  (1) 1/4 = 2/8 (2) 1/2 = 2/4 = 4/8
- Show me another proportion. Use rods.
- Proportions used in cooking. Art. Name other ways.
  Justify way of looking at comparisons.

  3/4 = /8 2/3 = /6 4/5 = /20 9/10 = /100 = %

IX. Cross product test demonstration on easier ones.

- Use cross product to find harder ones.
  3/4 = 5/ 4/5 = 30/ 2/3 = /10 5/8 = /4

X. Practice

15% =_____decimal = _____fraction
___= .65 =_____
___=_____ =3/8
___=_____ =9/20

Which is more: 5/8 = _____% 2/3 =_____% 3/5 = _____%

7/10 =_____% 4/5 =_____% 7/8 = _____5

Curriculum Notes:

I. **Cooperative Logic Puzzle**
Another logic warmup in envelopes would be a nice way to start the class.

II. **Review of arithmetic**
Make this quick and fun.

III. **Rods: Equivalency**
Start with the rods to study equivalency defined as equal in value but different in appearance. In order to show 1/2, two rods are needed: One is to show the unit (say, orange) and the other is to show how much of the unit is being designated (yellow is 1/2 of orange since it takes two yellows to equal one orange). Explore all the possibilities for showing 1/2 using the same unit. 1/2 could also be 5 whites when compared to 1 yellow, since it is equal to 10 whites. This form of 1/2 would be written 5/10. Try different forms using other units. Write the symbolism on the board. Have the students contribute these and verbalize their meaning.

IV. **Proportions**
Review the measuring exercise as a discussion unless the students need another activity. Using a set of rods that are designating 1/2 (say yellow and orange) ask if it takes say 10 yellow rods to measure this item, how many orange ones would it take? (If it takes 7 orange ones, how many yellow ones is a slightly more challenging extension.)

This relationship is a proportion and is written:

$1/2 = 5/10$ or if a part is missing, it is written:

$1/2 = x/10$ or $1/2 = ?/10$

A proportion is a statement using equivalent fractions.

V. **Percents**
A percent is a statement of equivalency using 100 for the denominator. It standardizes amounts so that they may be compared with each other. * On a test if one person gets 15/20 correct and another gets 20/25 correct, one way to compare these is by converting them both to percents. They both missed five questions, but the number of questions are different. To convert them to per cents they could be written:

V. **Percents Continued:**

15/20 = ?/100 (section 5 con't) 20/25 = ?/100

These problems could be done as fraction conversion problems.

15/20 = 75/100 20/25 = 80/100

The /100 means "per hundred" or could be translated as "per cent".

75/100 is 75% 80/100 is 80%

The scores are "standardized" and now can be compared. * The person getting 20/25 correct did a better job.

Practice converting percents to fractions:

2% = 2/100 5% = 5/100

VI. **Fractions**

Practice all of the fractional forms: Percents, decimals and fractions. Show how to convert from one to the other. 50% = 50/100. 50/100 can be reduced to 1/2. 50/100 can also be divided using 100 as the divisor with the result of .5. 1/2 converted this way also is .5. (Ask "why?")

Give lots of practice:

Use easily converted units: that is, numbers that are factors of 100, for the denominators of fractions to convert. Difficult units like 7ths or 6ths might be asked about and then these would be ok to illustrate.

VII. **Decimals**

Practicing converting 1% and 10% has extensions into mental arithmetic similar to the work done in Session 3. Knowing how to convert 10% to a decimal means that 5%, 15%, 20% and 25% is also known.
Illustrate this using tips, discounts or workplace examples.

10% of $200 = $20
20% of $200 = 10% + 10% = $20 + $20 = $40
5% of $200 = half of 10% = 1/2 of $20 = $10
15% of $200 = 10% + 5% = $20 + $10 = $30
25% of $200 = 10% + 10% + 5% = $40 +$10 = $50

VII. Decimals Continued:

Try a few of these with somewhat easy numbers, then a few more difficult ones to estimate:

15% of $32.50 25% of $59.95

VIII. Rods

Return to the rods to show 25% in 2 different ways. Try to bridge between the work with fractions and proportions done earlier. It is the understanding, intuitive level that is important here and the computation rules will then follow much more easily because they will have new meaning. People will more easily understand why things are done the way they are. Draw on personal or workplace examples again from the students. Use both percentage proportions and equivalencies with other than 100 for the denominators.

IX. Cross Product Test

The cross product test is one that works when two fractions are equivalent. 2/3 - 4/6. The cross product test says that the products obtained when multiplying the numerator of one by the denominator of the other are equal. This can help to find missing parts of other proportions.

3/4 = ? / 8. 3 x 8 = 4 x ?. 24 = 4 x ?. The missing number is 6. So 3/4 = 6/8.

Use this method on other difficult conversions like:

3/4 = 5/?. 3 x ? = 20. To solve for the missing number divide 20 by 3.

5/8 = ?% means 5/8 = ?/100. Cross products: 500 = 8 x ? Divide 500 by 8 and that is the percent or the missing quantity.

X. Practice

Do some estimations to calculate which is more 5/8, 2/3, or 3/5. Get students to guess and justify orally or by journaling their estimate. Then convert all to percentages to actually obtain the answer. Try the same thing with 7/10, 4/5, and 7/8.

Have the students generate problems to practice.

WORKPLACE MATH II: Math Works!
SESSION V

"I learned alot of material that was previously intimidating to me".
Math II Student

Learning Intentions:

- This session is a review session from the last several weeks. Students often need to see the same material more than once to feel fully confident with it. If the students in the class already have mastered this content, the instructor could discuss some examples of statistics, bring in newspapers for discussion of the statistics there and the mathematical meaning behind them or use the class as a forum to really apply the knowledge to the workplace.

- In the session, review problem solving in groups, conversions from fractional to decimal and to percentage forms, calculating percents mentally. The handout provided may be used in class or for homework.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Problem solving

II. Review % to fractions introduce % to decimal

III. Practice changing decimal - fraction - percent

IV. 15% of numbers using distributive law.

V. Handout

VI. Complete the Chart

	%	Decimal	Fraction
1)	50%	_____	_____
2)	_____	.45	_____
3)	_____	_____	1/4
4)	_____	.9	_____
5)	65%	_____	_____
6)	_____	_____	4/5

VII. Answer these

1 y = 1/2 or. 1 or = 2 y 1 or = 10 w

1 w = 1/10 or 1 r = 1/5 or 1 or == 5 r

If it takes 6 orange rods to measure the width of a table how many of each would it take:_____red _____ white _____ yellow.

If it takes 12 red rods to measure the width of a table, how many of each would it take: _____white _____ yellow _____ orange.

VIII. Complete

9/10 = ____/20 4/5 = ____ /10 6/8 = 4/____

What is:

20% of 320 =_____ 10% of 190 = _____

40% of 120 = _____ 15% of 80 = _____

50% of 90 = _____

- Shade the given percent

_____	_____	_____
_____	_____	_____
20%	50%	90%

- Explain "proportion"

WORKPLACE MATH II: Math Works!
SESSION VI

"It has helped me understand decimal conversions".
Math II Student

Learning Intentions:

- Review of mental arithmetic, fractions, percents and decimals. Use examples and journaling as much as possible. Try to get students to connect the concepts for themselves in writing. They may or may not choose to share what they have written, and this is all right. The more they can verbalize their understandings, the more solid they will be. In addition, the more they can connect the learning within itself and to their experience the more they will understand it.

- Use the time before the post test to reassure students, answer questions, and review. They should then be successful on the post test.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Review

- Mental addition

12	26	12			
24	39	14			11
38	47	16	14	37	58
+46	+18	+18	+26	+43	+22

- Mental multiplication

13	16	12	14	17	19
x 4	x 5	x 7	x 5	x 3	x 4
16	12	14	15	16	19
x 6	x18	x16	x15	x13	x11
17	15	22	23		
x13	x14	x11	x12		

I. Review Continued:

- Fractions: Blocks/Writing

1/3 + 1/2 =_____ 1/6 + 2/3 = _____ 1 1/6 + 1/3=_____

2 1/3 - 1 1/6 =_____ 3 1/6 - 1 1/3=_____ 3 1/2 - 1 1/4=_____

4 1/2 - 1 3/4=_____ 5/8 + 1/10=_____ 3 1/6 - 2 1/2=_____

- Repeated subt.

- Division

42/4 = 40/4 + 2/4 = 10 1/2 39/6 = 36/6 + 3/6 = 6 1/2

48/7 = 49/7 - 1/7 = 7 - 1/7 = 6 6/7 58/10 = 50/10 + 8/10 -5 8/10 =5 4/5

12/8 = 8/8 + 4/8 = 1 1/2

134/5 = 150/5 - 16/5 =150/5 - 15/5 - 1/5 = 30 - 3 - 1/5 = 27 - 1/5 = 26 4/5

32/9 = 48/5 = 168/7 =

If you had #16 - 49 how many is this?

II. Post test

III. Evaluations

- Daily Journal
  Students record comments about the class and how they can use their new skills on the job.

IV. Administrative Details

A. Post-evaluation
B. Course Evaluation
C. Instructor Evaluation
D. Certificates

WORKPLACE MATH II: Math Works!
SESSION VI

POST TEST

NAME:

I. Solve mentally. Check the "old"if you wish.

1. 14 + 16 = ____

2. 13 + 12 = ____

3. 48 - 19 = ____

4. 46 - 28 = ____

5. 16 + 18 + 17 + 19 = ____

6. 22 + 44 + 66 + 88 = ____

II. Do these the "new" way. Check using the "old" way if you wish.

7. $\frac{19}{3}$

8. $\frac{150}{7}$

III. Solve.

9. 2 2/3 + 1 1/2 =

10. 5 1/8 - 2 3/4 =

IV. Do the problem below "in terms" of anything you wish.

23 =

+ 37 =

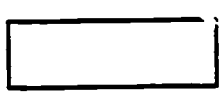
60

V. Complete.

12. 3/4 = _____%

13. 7/8 = _____%

14. Shade approximately 65% of the rectangle below.



VII. If it takes.....

15. 5 orange rods to measure the width of a table, how many red ones would it take? (1 or. = 5 r)

16. 5 yellow rods to measure the width of a table, how many orange ones would it take? (1 y = 1/2 or.)

VIII. Calculate the percent.

17. What is 15% of 150?

18. What is 80% of 150?

IX. Find the missing part of the proportion.

19. 2/5 = ?/12

WORKPLACE LEARNING PROGRAM
INSTRUCTOR EVALUATION
CURRENT AND PIKES PEAK COMMUNITY COLLEGE

Please check one response to each question.	Excellent	Very Good	Satisfactory	Needs Improvement	Poor
1. The instructor is organized in his/her teaching of this class.					
2. The instructor projects warmth, friendliness and enthusiasm in his/her presentation.					
3. The instructor returns tests and assignments within one class session.					
4. The instructor encourages student participation in class.					
5. The instructor reacts in a positive manner to students' questions and responses.					
6. The instructor is willing to give individual help when you request it.					
7. The instructor clearly communicates how the course is related to your learning needs.					
8. The instructor is skilled and knowledgeable in the material.					
9. You feel comfortable with asking your instructor to teach what you feel is important to your learning needs.					
10. By reviewing your portfolio, you are familiar with the changes in your own learning.					

What comments do you have that will help in the design of future courses?_____

_____

_____

_____

_____

WORKPLACE LEARNING PROGRAM
PARTICIPANT EVALUATION
CURRENT AND PIKES PEAK COMMUNITY COLLEGE

Please answer the questions which follow. Your responses will help us in making improvements in the course.

1. How would you rate the content of this course?

Too Difficult		Just Right		Too Easy
5	4	3	2	1

2. How would you rate the quality of the instruction materials?

Very Interesting		Somewhat Interesting		Uninteresting
5	4	3	2	1

3. How useful was the course in helping you on the job?

Very Useful		Somewhat Useful		Not Useful
5	4	3	2	1

4. Overall, how satisfied were you with the course?

Very Satisfied		Somewhat Satisfied		Very Dissatisfied
5	4	3	2	1

5. What did you like the best about this course?_____

6. What could have been done to improve the effectiveness of the course?_____

7. How would you rate the quality of the instructional materials?_____

8. Would you like additional time spent on this subject? Yes_____ No_____ If yes, what specific subjects?_____

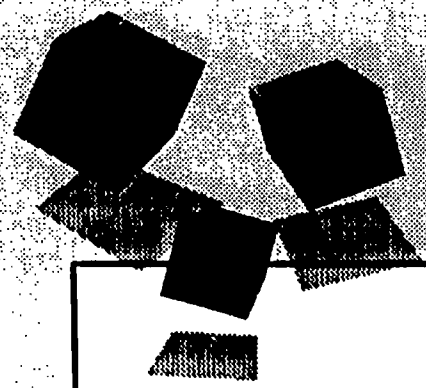
9. In what specific ways has this course helped you to do your job better?_____

10. How has this course helped meet goals you set before taking it?

11. Would you recommend this course to a co-worker? Yes_____No_____
Why or Why not?_____

12. Do you feel more confident about your learning abilities because of this class?_____

13. Will what you learned in class make a positive, noticeable difference in your outside interests?_____



SUPPLEMENTARY MATERIALS

The following is a more traditional approach to teaching Workplace Math II

Author: Claire Goschen

WORKPLACE MATH II

LESSON 1:

- Skills for a Competitive Workplace (forms and introduction)
- Pre-Test
- Math in the Workplace
- Place Values
- Rounding
- Exponents
- Order of Operations
- Estimation (do the results make sense)

LESSON 2:

- Review Fractions (add, sub., mult., div.)
- Conversion of Fractions and Decimals

LESSON 3:

- Decimals (add, sub., mult., div.)
- Conversion of Fractions and Decimals to Percent
- Solving Percent Problems

LESSON 4:

- Percent Example (99% fat free)
- Standard and Metric Conversions
- Ratios, Rates, and Proportions (solving for unknown)

LESSON 5:

- Equations
- Area and Volume
- Review and Questions

LESSON 6:

- Review and Questions
- Post-Test
- Course and Instructor Evaluation

MATH II PRE-TEST NAME _____

Reduce:

1. $\frac{34}{68}$

2. $\frac{200}{3500}$

Evaluate:

3. $\frac{2}{9}+\frac{1}{3}+\frac{5}{6}$

4. $4-\frac{3}{5}$

5. $\frac{5}{6}\times\frac{2}{3}$

6. $2\frac{6}{7}\times 4\frac{1}{5}$

7. $\frac{8}{15}\div\frac{2}{3}$

8. $4 - 0.922$

9. 2.25×1.3

10. $1.2\div 0.005$

11. $(7-5)\times 3+16\div 8-5$

12. $4+(2\times 3)-2^3\times 6\div 4+(7-5)$

13. Convert 7.62 cm to inches.
(given: 2.54 cm = 1 in)

14. Convert 2 ounces to grams.
(given: 1 oz = 28.33 g)

Evaluate:

15. Convert 3 / 16 to percent.

16. What is 12 % of 50 ?

17. 8 is what percent of 40 ?

18. Convert 12.5 % to a fraction.

19. 7% of what number is 3.5 ?

20. Which is more 3 / 8 or 40 % ?

Solve:

21. $\frac{n}{10} = \frac{2}{5}$

22. $\frac{16}{n} = 2$

23. $3 + x = y$ for $x = 5$

24. $7 - 2x = y$ for $x = 3$

Evaluate:

25. A credit card has a monthly interest of 20 %. If you owe $755, how much interest will you pay?

26. If 24 calendars out of a group of 192 were defective, what percent were defective?

27. If 500 sheets of paper measure 2 inches, how many inches will 400 sheets of paper measure? (hint: set up as a proportion)

28. If 6 boxes of cards cost $8.00, how many boxes can you buy for $12.00? (hint: set up as a proportion)

29. There are 30 stickers in one package which cost $2.00 and 25 stickers in another package which cost $1.25, which is the better value? (hint: determine the unit rate of each)

30. If you purchased items with the following prices estimate your bill: $10.13, $2.89, $5.24, $1.99

31. The length of a rectangle is 15 cm and its width is 10 cm. What is its perimeter and area ?

MATH IN THE WORKPLACE NAME _____

We use a variety of mathematical skills and reasoning both on the job and in other areas of our lives.

- determining whether you can meet a 2 o'clock deadline and have lunch if it is currently 9 o'clock.
- estimating how much paper is wasted given a certain layout.
- determining how long it will take a machine to run a certain job knowing that it took a job one third the size 10 minutes to be complected.
- finding the percent of defective items in a single batch and the average percentage of defective items in a number of batches.
- calculating the percent increase or decrease in paper cost as a function of the size of the order.

List examples in which you use math at work:

_____

_____

What type of math skills are required:

_____

Situations which require mathematics may involve determining which operations are required and a logical thinking process. in order to set up the problem. before the more straight forward calculations of addition. subtraction, multiplication. etc. are applied. These types of problem are called word or applied problems and may be the most common types of mathematical problems we encounter.

A combination of methods are often used to solve mathematical problems, including figuring in you head. using a pencil and paper, and/or a calculator. Which methods do you use the most ?

_____ in your head _____ pencil and paper _____ calculator

Which mathematical concepts do you use most in your work:

_____ whole numbers (+ - × ÷)	_____ averages	_____ conversions (decimal <to> fraction)
_____ decimals (+ - × ÷)	_____ estimating	_____ conversions (standard <to> metric)
_____ fractions (+ - × ÷)	_____ percents	_____ accuracy (is the answer reasonable)
_____ measurements	_____ proportions	_____ other

What are your goals for this class (be specific) ?

TOPIC	PROCEDURE	EXAMPLE
PLACE VALUE	- Each digit has a value depending on location. thousands hundreds tens ones . tenths hundredths thousandths 1000 100 10 1 . 1/10 1/100 1/1000 10^3 10^2 10^1 10^0 . 10^{-1} 10^{-2} 10^{-3} whole number . fraction	- In the number 931.475, what place value does the number 9 have? hundreds the number 5 have? thousandths the number 4 have? tenths
ROUNDING	- If the first digit to the right of the round-off place is less than 5, the digit in the round-off place is unchanged. - If the first digit to the right of the round-off place is 5 or more, increase the digit in the round-off place by one.	- Round to the nearest hundred: 48,273 in 48,273 7 is more than 5 so increase 2 (which is in the hundreds place) to 3 giving 48,300 - Round to the nearest tenth: 2.3476 in 2.3476 4 is less than 5 so 3 (which is in the tenths place) is unchanged giving 2.3
EXPONENT FORM	- A form to indicate repeated factors. - A factor refers to each of the numbers which are multiplied. (ex. 2 x 3 = 6, the numbers 2 and 3 are called factors) - note: $n^0 = 1$	- Write in exponent form: $3 \times 3 \times 3 \times 3 \times 3 = 3^5$ $47 \times 47 \times 47 = 27^3$ - Evaluate: $6^2 = 6 \times 6 = 36$ $2^4 = 2 \times 2 \times 2 \times 2 = 16$ $5^0 = 1$
ORDER OF OPERATION	- (1) Perform operations inside parentheses. - (2) Evaluate exponents. - (3) Do multiplication and division in order from left to right. - (4) Do addition and subtraction in order from left to right.	- Evaluate: $3^2 + (6 + 10) / 2^2 \times 5 + (7 - 3)$ $3^2 + (6 + 10) / 2^2 \times 5 + (7 - 3) =$ $3^2 + 16 / 2^2 \times 5 + 4 =$ $9 + 16 / 4 \times 5 + 4 =$ $9 - 8 \times 5 + 4 =$ $9 + 40 + 4 = 53$

Place Value 1.1

For the number 941,026.587

1. digit in the hundred-thousands place _____
2. digit in the tenths place _____
3. digit in the ones place _____
4. digit in the hundredths place _____

Rounding 1.2

1. Round 354,566 to the nearest thousands _____
2. Round 789 to the nearest hundreds _____
3. Round 147.388 to the nearest tenths _____
4. Round 0.4567 to the nearest hundredths _____

Exponents 1.3

Write in exponent form:

1. $7 \times 7 \times 7 \times 7 \times 7$ _____
2. $3 \times 3 \times 3 \times 3$ _____
3. 41×41 _____
4. 52 _____

Find the value of each expression:

5. 2^5 _____
6. 9^2 _____
7. 137^0 _____
8. 5^3 _____

Order of Operation 1.4

Evaluate:

1. $9 - 2 \times 3 \div 12 =$

2. $2 \times 3 + (7 - 5) \times 4 / 2 - (4 + 1) =$

3. $5^2 - 7 + 12 / 2 \div (15 - 14) =$

4. $(3 \div 2) \times 3^2 \div 7 - 16 / 2^3 =$

Solutions:

Section 1.1 **1.** 9 **2.** 5 **3.** 6 **4.** 8 Section 1.2 **1.** 355,000 **2.** 800 **3.** 147.4 **4.** 0.46

Section 1.3 **1.** 7^5 **2.** 3^4 **3.** 41^2 **4.** 52^1 **5.** 32 **6.** 81 **7.** 1 **8.** 125

Section 1.4 **1.** 15 **2.** 5 **3.** 25 **4.** 50

TOPIC	PROCEDURE	EXAMPLE
ADDING AND SUBTRACTING FRACTIONS	- Find the lowest common denominator (LCD) of the fractions. - Build up each fraction to obtain the LCD in the denominator. - Add or subtract the numerators keeping the common denominator.	$\frac{2}{3}+\frac{5}{6}+\frac{1}{2}=\frac{2\times2}{2\times3}+\frac{5}{6}+\frac{3\times1}{3\times2}=\frac{4}{6}+\frac{5}{6}+\frac{3}{6}=\frac{4+5+3}{6}=\frac{12}{6}=2$ $\frac{3}{5}-\frac{4}{15}=\frac{3\times3}{3\times5}-\frac{4}{15}=\frac{9}{15}-\frac{4}{15}=\frac{9-4}{15}=\frac{5}{15}=\frac{3}{5}$
ADDING AND SUBTRACTING MIXED FRACTIONS	- Find the lowest common denominator for the fractional part. - Add whole numbers and fractional parts separately. - Borrow from whole number if necessary then subtract whole numbers and fractional parts separately. - Reduce if possible.	$2\frac{1}{3}+1\frac{4}{9}=2\frac{3\times1}{3\times3}+1\frac{4}{9}=2+1+\frac{3}{9}+\frac{4}{9}=3\frac{7}{9}$ $5\frac{1}{4}-1\frac{7}{8}=5\frac{2\times1}{2\times4}-1\frac{7}{8}=5\frac{2}{8}-1\frac{7}{8}=4\frac{8}{8}+\frac{2}{8}-1\frac{7}{8}=$ $4\frac{10}{8}-1\frac{7}{8}=3\frac{10-7}{8}=3\frac{3}{8}$
MULTIPLYING FRACTIONS	- Change any whole number to a fraction with a denominator of 1. - Change any mixed fraction to an improper fraction. - Cancel any common factors in the numerators and denominators. - Multiply numerators, multiply denominators. - Reduce if possible.	$\frac{4}{5}\times\frac{1}{7}\times3=\frac{4}{5}\times\frac{1}{7}\times\frac{3}{1}=\frac{4\times1\times3}{5\times7\times1}=\frac{12}{35}$ $4\frac{4}{5}\times\frac{2}{3}\times3\frac{1}{2}=\frac{24}{5}\times\frac{2}{3}\times\frac{7}{2}=\frac{8}{5}\times\frac{7}{3}=\frac{56}{15}$

TOPIC	PROCEDURE	EXAMPLE
DIVIDING FRACTIONS	- Change any whole number to a fraction with a denominator of 1. - Change any mixed fraction to an improper fraction. - Change the division sign to multiplication and invert the second fraction. - Cancel any common factors in the numerators and denominators. - Multiply numerators, multiply denominators. - Reduce if possible.	$\frac{1}{3}\div\frac{2}{5}=\frac{1}{3}\times\frac{5}{2}=\frac{1\times5}{3\times2}=\frac{5}{6}$ $\frac{3}{4}=3\div4=0.75$ $\frac{2}{3}=2\div3=0.6666$ *round to thousandths* $\frac{2}{3}=0.667$ $2\frac{1}{4}=2+\frac{1}{4}=2+(1\div4)=2+0.25=2.25$
CONVERTING FRACTIONS TO DECIMALS	- Divide the denominator into the numerator until: (1) the remainder is zero, or (2) the decimal repeats itself, or (3) the desired number of decimal places is achieved.	$\frac{2}{3}\div5\times4\frac{2}{7}=\frac{2}{3}\div\frac{5}{1}\times\frac{30}{7}=\frac{2}{3}\times\frac{1}{5}\times\frac{30}{7}=$ $\frac{2}{3}\times\frac{6}{7}=\frac{2}{1}\times\frac{2}{7}=\frac{4}{7}$
CONVERTING A DECIMAL TO A FRACTION	- Determine the number of places to the right of the decimal (this will equal the number of zeros in the denominator). - This determines the value of the denominator. - Place the given number without its decimal point over the appropriate denominator. - Reduce if possible	$0.125=\frac{125}{1000}=\frac{1}{8}$ $2.05=2+0.05=2+\frac{5}{100}=2\frac{1}{20}$

Reducing Fractions 2.1

1. $\frac{14}{21}=$ 2. $\frac{2}{18}=$ 3. $\frac{200}{525}=$

Addition and Subtraction of Fractions 2.2

1. $\frac{5}{7}-\frac{9}{14}+\frac{1}{2}=$
2. $\frac{7}{10}+\frac{3}{5}+\frac{2}{20}=$
3. $2\frac{2}{3}+5+\frac{7}{9}=$
4. $\frac{19}{20}-\frac{3}{10}=$
5. $\frac{4}{5}-\frac{2}{15}-\frac{1}{3}=$
6. $3\frac{5}{6}-2\frac{11}{12}=$
7. $3\frac{1}{2}+\frac{3}{5}-1\frac{9}{10}+4-\frac{7}{20}=$

Multiplying and Dividing Fractions 2.3

1. $\frac{3}{5}\times\frac{6}{7}\times 3=$ 2. $2\frac{7}{10}\times\frac{1}{2}\times\frac{3}{5}=$ 3. $\frac{4}{33}\times\frac{11}{20}=$
4. $\frac{4}{9}\div\frac{3}{5}=$ 5. $\frac{5}{7}\div 1\frac{1}{3}=$ 6. $\frac{1}{2}\div\frac{3}{4}\times 1\frac{4}{5}=$

Converting Fractions and Decimals 2.4

1. $\frac{3}{8}=$ 2. $2\frac{1}{5}=$ 3. $\frac{6}{33}=$
4. 0.24 = 5. 4.55 = 6. 0. 125 =
7. $\frac{3}{8}+0.024+2=$ 8. Is 0.125 more or less than $\frac{2}{5}$?

Solutions:

Sec. 2.1 **1.** 2/3 **2.** 1/9 **3.** 8/21 Sec. 2.2 **1.** 13/7 **2.** 7/5 **3.** 7 13/9 **4.** 13/20 **5.** 1/3 **6.** 11/12 **7.** 5 17/20 Sec. 2.3 **1.** 54/35 **2.** 81/100 **3.** 1/15 **4.** 20/27 **5.** 15/28 **6.** 6/5 Sec.2.4 **1.** 0.375 **2.** 2.2 **3.** 0.18 **4.** 6/25 **5.** 4 11/20 **6.** 1/8 **7.** 2.399 **8.** less

TOPIC	PROCEDURE	EXAMPLE
ADDITION AND SUBTRACTION OF DECIMALS	- Write the numbers vertically and line up the decimal points. -Add or subtract the digits with the same place value. Use carrying or borrowing as needed.	Add: 12.78 6500.00 + 64.07 6576.85 Subtract: 476.382 - 52.050 424.332
MULTIPLYING DECIMALS	- Multiply the numbers just as you would whole numbers. - Find the sum of the decimal places in the two factors. - Place the decimal point in the product so that it is the same number of places to the left as determined by the sum in the preceding step.	Multiply: 2.4 x 0.06 = 0.144 (the sum of decimal places of the two products equals 3) 3001.46 x 22.117 = 6638.29082 (the sum of the decimal places of the two products equals 5)
DIVIDING DECIMALS	- Make the divisor a whole number by moving the decimal point to the right. - Move the decimal point in the dividend to the right the same number of places. - Place the decimal point in your answer directly above the decimal point in the dividend.	Divide: 0.06) 0.162 2.7 006.) 016.2 12 42 42 0 0.003) 85.8 28600.0 0003) 85800.0 6 25 24 18 18 0
CHANGING DECIMALS TO PERCENT	- Move the decimal two places to the right multiplying by 100). - Add the percent sign %.	Change to a percent: 0.19 = 19 % 0.516 = 51.6 % 1.53 = 153 % 0.006 = 0.6 %

TOPIC	PROCEDURE	EXAMPLE
CHANGING PERCENT TO A DECIMAL	- Move the decimal two places to the left (dividing by 100). - Drop the percent sign.	Change to a decimal: 49 % = 0.49 2 % = 0.02 0.5 % = 0.005 196 % = 1.96
CHANGING FRACTIONS AND PERCENTS	- First convert the fraction or the percent to its decimal form. - Follow the procedure for converting decimals and percents.	Fraction <to> Decimal <to> Percent 3/4 = 0.75 = 75 % 3 1/4 = 3.25 = 325 % 1/2 = 0.5 = 50 % 6 4/5 = 6.8 = 680 %
SOLVING PERCENT PROBLEMS	- Translate by replacing: " of " by x " is " by = " what " by n " find " by n = - Solve the resulting equation.	What is 3 % of 56 ? n = 3 % x 56 n = (0.03) x 56 = 1.68 16 % of what is 208 ? 16 % x n = 208 (0.16) x n = 208 n = 208 / 0.16 = 1300
FINDING THE RATE IN PERCENT PROBLEMS	$RATE = \frac{PART}{BASE}$	123 is what percent of 820? $\frac{20}{35} = \frac{4}{7}$ Part = 123 Base = 820 John earns $1500 a month. If he spends $375 on rent each month, what percent of his income does he spend on rent? Part = $375 Base = $1500 $RATE = \frac{PART}{BASE} = \frac{\$375}{\$1500} = 0.25 = 25\%$
PERCENT CHANGE (INCREASE OR DECREASE)	- Subtract the final amount (new amount) from the initial amount (original amount). - Divide the difference by the initial amount (original amount). - Convert the decimal to a percent (multiply by 100 and add %).	$\frac{final - initial}{initial} \times 100 = \%\ change$ Jan just received her annual cost of living raise. Her original monthly salary was $1450.00. Her new monthly salary is $1508.00. What is the rate of increase? $\frac{\$1508 - \$1450}{\$1450} \times 100 = 4\%$

Decimals 3.1

1. $1.9 \div 2.36 \div 15.2 \div 0.08 =$
2. $28.07 - 19.368 =$
3. $13.45 \div 0.2 - 1.60 \div 2 - 0.48 =$
4. $56.8 \times 0.02 =$
5. $75 \times 1.25 \times 2.26 =$
6. $0.0648 \div 0.06 =$
7. $(0.05)^3 + 2.18 \div 0.05 - 1.08 =$
8. $(2.1)^3 - 0.2 \times 0.5 \div 6.4 \div 0.2 =$

Fraction <to> Decimal <to> Percent 3.2

	Fraction	Decimal	Percent
1.	5/12		
2.		0.06	
3.			40 %
4.			2 5/8 %

Percent Problems 3.3

1. 22 is what percent of 85?
2. What is 18% of 92?
3. 55% of what number is 58?
4. 0.75% of 250 is what number?
5. 60% of what number is 25:

Solutions:

Section 3.1 **1.** 19.54 **2.** 8.702 **3.** 13.57 **4.** 1.136 **5.** 211.875 **6.** 1.08 **7.** 42.520125 **8.** 41.161 **Section 3.2** **1.** 0.4167, 41.67% **2.** 3/50, 6% **3.** 2/5, 0.4 **4.** 21/800, 0.02625 **Section 3.3** **1.** 25.88% **2.** 16.56 **3.** 105.45 **4.** 1.875 **5.** 41.67

Percent Word Problems 3.4

1. A total of 25 ceramics in a shipment of 625 were damaged. What percent were damaged?

2. Tom has $21.60 of his weekly paycheck withheld for federal income tax. He earns $180 weekly. What percent of his income is withheld for federal income tax?

3. Tina's card shop ordered 60 boxes of cards. Each box of cards contained 15 individual cards of which 5 were note cards. What percentage of note cards were there in each box? What percentage of note cards were there in the entire order?

4. Calendars originally priced at $12 were sold for $3. What was the percent discount?

5. Cards originally priced at $8 per box were sold for $3. What was the percent discount?

Solutions:
Section 3.4 1. 4% 2. 12% 3. 33%, 33% 4. 75% 5. 62.5%

TOPIC	PROCEDURE	EXAMPLE
UNIT FRACTION	- A fraction used to convert one unit to another. - Relationships between units may be obtained from a reference tables found in dictionaries. manuals. and text books.	$12\ inches = 1\ foot$ $\frac{12\ inches}{12\ inches} = \frac{1\ foot}{12\ inches}$ $1 = \frac{1\ foot}{12\ inches}$ $\frac{12\ inches}{1\ foot} = \frac{1\ foot}{1\ foot}$ $1 = \frac{12\ inches}{1\ foot}$
CHANGING FROM ONE AMERICAN UNIT TO ANOTHER.	- Find the one equality statement that relates what you want to find and what you know. - Form a unit fraction. the denominator will contain the unit you now have. - Cancel units and multiply by the unit fraction.	Convert 36 inches to feet: 12 inches = 1 foot unit fraction $1 = \frac{1\ foot}{12\ inches}$ $36\ in \times \frac{1\ ft}{12\ in} = \frac{36 \times 1\ ft}{12} = 3\ feet$
AMERICAN UNITS EQUIVALENT MEASURES	<u>weight:</u> 16 ounces = 1 pound — 16 oz = 1 lb 2000 pounds = 1 ton — 2000 lb = 1 ton <u>volume:</u> 2 cups = 1 pint — 2 c = 1 pt 2 pints = 1 quart — 2 pt = 1 qt 4 quarts = 1 gallon — 4 qt = 1 gal	<u>length:</u> 12 inches = 1 foot — 12 in = 1 ft 3 feet = 1 yard — 3 ft = 1 yd 5280 feet = 1 mile — 5280 ft = 1 mi <u>time:</u> 60 seconds = 1 minute — 60 sec = 1 min 60 minutes = 1 hour — 60 min = 1 hr 24 hours = 1 day — 24 hr = 1 d 7 day = 1 week — 7 d = 1 wk
CONVERTING BETWEEN AMERICAN UNITS AND METRIC UNITS	- Pick an equivalent measure. Multiply by a unit fraction. <u>American and Metric Equivalents:</u> 1mi = 1.61 km — 1 km = 0.62 mi 1 yd = 0.914 m — 1 m = 1.09 yd 1 ft = 0.305 m — 1 m = 3.28 ft 1 in = 2.54 cm — 1 cm = 0.394 in 1 gal = 3.79 L — 1 L = 0.264 gal 1 qt = 0.946 L — 1 L = 1.06 qt 1 lb = 0.454 kg — 1 kg = 2.2 lb 1 oz = 28.33 g — 1 g = 0.0353 oz	Convert 3 inches to centimeters: $3\ in \times \frac{2.54\ cm}{1\ in} = 3 \times 2.54\ cm = 7.62\ cm$ Convert 2 ounces to grams: $2\ oz \times \frac{1\ g}{0.0353\ oz} = \frac{2\ g}{0.0353} = 56.66\ g$ Concert 60 kilograms to pounds: $60\ kg \times \frac{2.2\ lb}{1\ kg} = \frac{60 \times 2.2\ lb}{1} = 132\ lb$

CONVERSION OF METRIC TO METRIC	- When you change from one prefix to another moving to the left, move the decimal point the same number of place to the left. - When you change from one prefix to another moving to the right, move the decimal point the same number of place to the right. kilo hecto deca one unit . deci centi milli 1000 100 10 1 . 1/10 1/100 1/1000 10^3 10^2 10^1 10^0 . 10^{-1} 10^{-2} 10^{-3}	Change 5.25 meters to kilometers 5.25m x 1km / 1000m = 0.00525 km 5.25 m = 0.00525 km Change 5.25 grams to milligrams 5.25g x 1000mg / 1g = 5250 mg 5.25 g = 5250 mg
RATIOS	- A ratio is a comparison of two qualities that have the same units. A ratio is usually expressed as a fraction. - Reduce if possible.	Find the ratio of 20 books to 35 books. Bob earns $205 each week with $15 withheld for medical insurance. Find the ratio of medical insurance to pay. $\frac{\$15}{\$205} = \frac{3}{50}$
RATES	- A rate is a comparison of two quantities that have different units. A rate is usually expressed as a fraction in reduced form. - A unit rate is a rate with a denominator of 1. Divide the numerator by the denominator to obtain the unit rate.	- A company has 2520 production line employees and 25 managers. What is the rate of production line employees to managers: $\frac{2520\ production}{25\ managers} = \frac{504\ production}{5\ managers}$ - A machine prints 150 cards in 30 minutes. Find the unit rate. $\frac{150cards}{30minutes} = \frac{5cards}{minutes}$
PRO-PORTIONS	- A proportion is a statement that two rates or two ratios are equal. A proportion statement a is to b as c is to d can be written: $\frac{a}{b} = \frac{c}{d}$	Write a proportion for 17 is to 34 as 13 is to 26. $\frac{17}{34} = \frac{13}{26}$
CROSS MULTIPLYING	- Given a proportion such as $\frac{n}{3} = \frac{10}{15}$ then to cross multiply you have the products 15 x n = 3 x 10 15n = 3 x 10	$\frac{2}{9} = \frac{4}{n}$ $2n = 4 \times 9$ $2n = 36$ $\frac{2n}{2} = \frac{36}{2}$ $n = 9$

Conversions 4.1 (if necessary round to tenths place)

1. 36 inches to feet
2. 2 feet to inches
3. 180 seconds to minutes
4. 2 pounds to ounces
5. 6 pints to quarts
6. 3 gallons to liters
7. 8 liters to quarts
8. 10 miles to kilometers
9. 5 meters to yards
10. 20 inches to centimeters
11. 8 grams to ounces
12. 154 pounds to kilograms

Converting Metric to Metric 4.2

1. Convert 314 decaliter to kiloliter.
2. Convert 2 kilograms to grams.
3. Convert 5.75 decimeters to millimeters.
4. Convert 4517 milliliters to liters.
5. Convert 83 centimeters to meters.
6. Convert 8 meters to decimeters.

Solving Proportions 4.3

1. $\frac{n}{4}=\frac{1}{2}$
2. $\frac{7}{n}=14$
3. $\frac{3}{8}=\frac{n}{2}$
4. $\frac{2}{5}=\frac{6}{n}$
5. $\frac{n}{10}=\frac{9}{3}$
6. $10=\frac{20}{n}$
7. $\frac{15}{5}=\frac{n}{2}$
8. $\frac{25}{8}=\frac{2}{n}$

Solutions: Sec. 4.1 **1.** 3 ft **2.** 24 in **3.** 3 min **4.** 48 oz **5.** 3 qt **6.** 11.4 gal **7.** 8.5 qt **8.** 16.1 km **9.** 5.5 yd **10.** 50.8 cm **11.** 0.3 oz **12.** 70 kg Sec. 4.2 **1.** 3.14 km **2.** 2000 g **3.** 575 mm **4.** 4.517 L **5.** 0.83 m **6.** 80 decim Sec. 4.3 **1.** 2 **2.** 1/2 **3.** 3/4 **4.** 15 **5.** 30 **6.** 2 **7.** 6 **8.** 16/25

Rates and Proportions 4.4

1. A machine can fold 72 cards in 6 minutes. How many cards are folded per minute?

2. There are a total of 600 stickers on 75 sheets. How many stickers are there on each sheet?

3. A printing press uses 3 ounces of dye to print 20 bookmarks. How many ounces would be needed to print 100 bookmarks?

4. If 15 calendars cost $180. How much would 20 calendars cost?

5. If 500 sheets of paper are 2.5 inches deep. How many sheets of paper would be needed to fill a 3 inch box?

Solutions: Section 4.4 **1.** 12 **2.** 8 **3.** 15 **4.** $240 **5.** 600

TOPIC	PROCEDURE	EXAMPLE
EQUATIONS	- Equations are numerical sentences with variables. - Equation can indicate an equality between two expressions. - The terms in an equation can be manipulated as long as the equality or balance is not altered.	$7 + 13 = n$ $12 + 3 - 5 = n$ $n = n$ $2n - 4 = 10$ $2n + 3n = 5n$ $(10 - 3 + 2 + 4)y = (20 + 6 - 16 \div 3)y$ $.75n = \frac{3}{4}n$
VARIABLE	- A variable is a letter used to represent a number or unknown quantity.	Equation in one variable: $2z + 7 + (z - 5) = 10 - z$
LIKE TERMS	- Like terms are either numbers which do not have variable or terms that have identical variables.	Like terms: 13, 3/4, 5.25 Like terms in *y*: 4y, 0.15y 31y
PROPERTIES FOR SOLVING EQUATIONS	- Identity Property of Multiplication: One times any number or variable is equal to that number or variable. - Additive Inverse Property: Adding a number or variable and its inverse equal zero. - Mutiplicative Inverse Property: for every number n the exists a number $\frac{1}{n}$ such that $n(\frac{1}{n}) = \frac{n}{1} \times \frac{1}{n} = 1$	$1 \times 5 = 5$ $1n = n$ $1 \times (n - 5) = n + 5$ $2 - 2 = 0$ $2n - 2n = 0$ $\frac{4}{5} - \frac{4}{5} = 0$ $7 \times \frac{1}{7} = \frac{7}{1} \times \frac{1}{7} = \frac{7 \times 1}{1 \times 7} = \frac{7}{7} = 1$
FORMS OF ONE	- Any number or expression divided by the same number or expression equals 1.	$\frac{5}{5} = 1$ $\frac{n}{n} = 1$ $\frac{2n+17}{2n+17} = 1$ $\frac{y(6-n)}{y(6-n)} = 1$

PERIMETER OF A RECTANGLE PERIMETER OF A SQUARE	- Perimeter of a rectangle: perimeter = 2 x width + 2 x length p = 2w + 2l - Perimeter of a square: perimeter = 4 x side length p = 4s	Find the perimeter of a rectangular card with a width = 5 inches and length = 7 inches p = 2 x 5 in + 2 x 7 in p = 10 in + 14 in = 24 in Find the perimeter of a square calendar if the side length = 15 in p = 4 x s = 4 x 15 in = 60 in
AREA OF A RECTANGLE AREA OF A SQUARE	- Area of a rectangle: Area = length x width A = lw - Area of a square: Area = side length x side length $A = s \times s = s^2$	Find the area of a rectangular sheet of art board where: length = 1.25 m and width = 0.75 m Area = length x width A = lw = 1.25 m 0.75 m $A = 0.94\ m^2 = 0.94$ sq m (sq = square) Find the area of a square card where the length of a side equals 12.5 cm. $A = s^2 = (12.5\ cm)^2$ A = 12.5 cm x 12.5 cm $A = 156.25\ cm^2 = 156.25$ sq cm (sq = square)
VOLUME OF A RECTANGLE VOLUME OF A SQUARE	Volume of a rectangle: Volume = length x width x height V = lwh Volume of a square: Volume = side length x side length x side length $V = s \times s \times s = s^3$	Find the volume of a rectangular box where: l = 3 ft w = 1.5 ft h = 2 ft V = lwh = 3 ft x 1.5 ft x 2 ft $V = 9\ ft^3 = 9$ cubic ft Find the volume of a square box if each side is 1 meter in length. s = 1 m $V = s^3 = (1\ m)^3 = 1\ m \times 1m \times 1\ m$ $V = 3\ m^3 = 3$ cubic m
MEAN OR AVERAGE	- The mean or average is equal to the set of values added together and then divided by the number of values. - mean = sum / number of values	Find the mean of the following values: 4, 12, 5, 11, 8, 6, 10 (4 + 12 + 5 + 11 + 8 + 6 + 10) / 7 = 56 / 7 = 8 mean value = 8

Solving Equations 5.1

1. $3 + 5 = y$
2. $7 - 2 = y$
3. $10 + 2x = y$ if $x = 3$
4. $9 - 3x = y$ if $x = 2$
5. $8 + 2x - 3 = y$ if $x = 5$
6. $20 - 3x + 2 = y$ if $x = 6$
7. $x + 2 = 4$
8. $8 + x = 10$
9. $x - 5 = 15$
10. $x - 7 = 13$
11. $3 + x + 8 = 12$
12. $4 - 2 + x = 8$

Combine Like Terms 5.2

1. $15y + 7 - 2 + 4y + 2y$
2. 8 in + 3 ft + 2.5 in + 0.5 ft + 1.5 in

Perimeter 5.3

1. Given a rectangle where the length = 2 ft and the width = 1.5 ft, find the perimeter.
2. Find the perimeter of a square if one of the sides is 3 m long.
3. Three square are set side by side. If each side of the square is 5 inches long, find the perimeter of the rectangle they form.

Area 5.4

1. Find the area of a rectangular card, with a length = 8 cm and a width = 6 cm.
2. If 6 square cards are printed on a sheet of paper, find the area of the paper if each side of a card is 4 in. long.
3. Four cards are cut from a sheet of art paper. The length of each card is 5 cm long and the width of each card is 3 cm long. The dimensions for the sheet of art paper are 10.5 cm by 6.5 cm. How much waste is there per sheet of art paper?
4. If 10 cards are to be cut from a single sheet of paper which measures 3 feet by 2 feet. What is the area of each card in inches? If the cards are to be folded and the design is only printed on the face of each card, what is the area of printed surface?

Solutions: sec. 5.1 **1.** 8 **2.** 5 **3.** 16 **4.** 3 **5.** 15 **6.** 4 **7.** 2 **8.** 2 **9.** 20 **10.** 20 **11.** 1 **12.** 6
sec. 5.2 **1.** 21y + 5 **2.** 4.5 ft sec. 5.3 **1.** 7 ft **2.** 12 m **3.** 40 cm
sec. 5.4 **1.** 48 sq cm **2.** 96 sq in **3.** 8.25 sq cm **4.** 7.2 sq in, 3.6 sq in

Volume 5.5

1. A box containing note cards has the following dimensions: length = 5 in width = 3 in depth = 2 in
   What is the volume of each box?

2. A shipping box has the following dimension: length = 18 in width = 15 in depth = 20 in
   What is the volume of the box?

3. Given the information from problem 1 and 2, how many boxes of note cards will fit in the shipping box?

Miscellaneous Problems 5.6

1. Which is a better deal, $5.00 off or a 35% discount if the cost of the item is $12.00?

2. Which is a better deal, $5.00 off or a 35% discount if the cost of the item is $18.00?

3. If a business lunch came to $23.34 and the standard tip was 15%.
   How much would you need to leave for a tip?

Mean Value 5.7

1. Find the mean value of: 3.25, 2, 1.5, 0.25, 3

2. Find the mean value in percent of: 10%, 25%, 15%, 10%, 20%, 10%

3. Find the mean value of: 5, $4\frac{3}{4}$, 6, $8\frac{1}{4}$

4. Find the mean value and comment on how reflective it is: 9000, 11000, 8000, 12000, 110000

Solutions:

Sec. 5.5 **1.** 30 cubic in **2.** 5400 cubic inches **3.** 180 boxes Sec. 5.6 **1.** $5.00 off **2.** 35% off **3.** $3.50
Sec. 5.7 **1.** 2 **2.** 15% **3.** 6 **4.** 3000, not very informative - a more informative mean would be 10000